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SEQUENCE LISTING

<110> Dalemans, Wilfried L.J.
Gerard, Catherine Marie Ghislaine

<120> Vaccine

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<140> 09/581,976

<141> 2000-06-20

<150> PCT/EP98/08563

<151> 1998-12-18

<150> GB 9727262.9

<151> 1997-12-24

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<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
16)

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Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
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Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
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Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60

Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65 70 75 80
 Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85 90 95
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu
 115 120 125
 Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser
 130 135 140
 Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro
 145 150 155 160
 Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser
 165 170 175
 Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu
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 195 200 205
 Gln Lys Pro Thr Ser Gly His His His His His His
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<211> 663

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<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
 influenza B and E7 from Human papilloma virus type
 16)

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt	180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc	240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt	300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca	360
ttgcatgaat atatgttaga ttgcaacca gagacaactg atctctactg ttatgagcaa	420
ttaaatgaca gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg	480
gacagagccc attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg	540
tgcgtacaaa gcacacacgt agacattcgt actttggaag acctgttaat gggcacacta	600
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taa

663

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<213> Artificial Sequence

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<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
16)

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc 240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg acittacctt aaaagaaatt 300
caaagtttag aaatgacaga aaactttgaa accatggcca tgtttcagga cccacaggag 360
cgaccagaa agttaccaca gttatgcaca gagctgcaaa caactataca tgatataata 420
ttagaatgtg tgtactgcaa gcaacagtta ctgcgacgtg aggtatatga ctttgctttt 480
cgggatttat gcatagtata tagagatggg aatccatatg ctgtatgtga taaatgttta 540
aagttttatt ctaaaattag tgagtataga cattattgtt atagtttgta tggaacaaca 600
ttagaacagc aatacaacaa accgttgtgt gatttgttaa ttaggtgtat taactgtcaa 660
aagccactgt gtcctgaaga aaagcaaaga catctggaca aaaagcaaag attccataat 720
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<211> 273
<212> PRT
<213> Artificial Sequence

<220>
<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
16)

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Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp																																							
35										40										45																																		
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val																																							
50										55										60																																		
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe																																							
65										70										75										80																								
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr																																							
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Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met																																							
100										105										110																																		
Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu	Pro	Gln	Leu																																							
115										120										125																																		
Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu	Glu	Cys	Val																																							
130										135										140																																		
Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp	Phe	Ala	Phe																																							
145										150										155										160																								
Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr	Ala	Val	Cys																																							
165										170										175																																		
Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr	Arg	His	Tyr																																							
180										185										190																																		
Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr	Asn	Lys	Pro																																							
195										200										205																																		
Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys	Pro	Leu	Cys																																							
210										215										220																																		
Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg	Phe	His	Asn																																							
225										230										235										240																								
Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys	Arg	Ser	Ser																																							
245										250										255																																		
Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Thr	Ser	Gly	His	His	His	His	His																																							
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His																																																						

<210> 5

<211> 1116

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and E6E7 fusion from Human papilloma virus type 16)

<400> 5

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggg 180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaatc 240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300
caaagtttag aaatgacaga aaactttgaa accatggcca tgtttcagga cccacaggag 360
cgaccagaa agttaccaca gttatgcaca gagctgcaaa caactataca tgatataata 420
ttagaatgtg tgtactgcaa gcaacagtta ctgcgacgtg aggtatatga ctttgctttt 480
cgggatttat gcatagtata tagagatggg aatccatatg ctgtatgtga taaatgttta 540
aagttttatt ctaaaattag tgagtataga cattattgtt atagtttgta tggaacaaca 600
ttagaacagc aatacaacaa accgttgtgt gatttggtta ttaggtgtat taactgtcaa 660
aagccactgt gtcctgaaga aaagcaaaga catctggaca aaaagcaaag attccataat 720
ataaggggtc ggtggaccgg tcgatgtatg tcttggttga gatcatcaag aacacgtaga 780
gaaaccagc tgatgcatgg agatacacct acattgcatg aatatatgtt agatttgcaa 840
ccagagacaa ctgatctcta ctgttatgag caattaaatg acagctcaga ggaggaggat 900
gaaatagatg gtccagctgg acaagcagaa cggacagag cccattacaa tattgtaacc 960
ttttgttgca agtgtgactc tacgcttcgg ttgtgcgtac aaagcacaca cgtagacatt 1020
cgtactttgg aagacctgtt aatgggcaca ctaggaattg tgtgccccat ctgttctcag 1080
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<210> 6

<211> 371

<212> PRT

<213> Artificial Sequence

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<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6E7 fusion from Human papilloma
virus type 16)

<400> 6

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Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80

Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr			
				85					90					95				
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met			
			100					105					110					
Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu	Pro	Gln	Leu			
		115					120					125						
Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu	Glu	Cys	Val			
	130					135					140							
Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp	Phe	Ala	Phe			
145					150					155					160			
Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr	Ala	Val	Cys			
				165					170					175				
Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr	Arg	His	Tyr			
		180						185					190					
Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr	Asn	Lys	Pro			
	195						200					205						
Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys	Pro	Leu	Cys			
	210					215					220							
Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg	Phe	His	Asn			
225					230					235					240			
Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys	Arg	Ser	Ser			
			245					250					255					
Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Met	His	Gly	Asp	Thr	Pro	Thr	Leu			
		260					265						270					
His	Glu	Tyr	Met	Leu	Asp	Leu	Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Cys			
	275					280						285						
Tyr	Glu	Gln	Leu	Asn	Asp	Ser	Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly			
	290					295					300							
Pro	Ala	Gly	Gln	Ala	Glu	Pro	Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr			
305					310					315					320			
Phe	Cys	Cys	Lys	Cys	Asp	Ser	Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr			
			325					330					335					
His	Val	Asp	Ile	Arg	Thr	Leu	Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly			
		340					345					350						
Ile	Val	Cys	Pro	Ile	Cys	Ser	Gln	Lys	Pro	Thr	Ser	Gly	His	His	His			
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His	His	His																
	370																	

<210> 7
 <211> 663
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and mutated E7 from Human papilloma
virus type 16)

<400> 7

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgttttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc      240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca      360
ttgcatgaat atatgttaga tttgcaacca gagacaactg atctctacgg ttatcagcaa      420
ttaaattgaca gctcagagga ggaggatgaa atagatggtc cagctggaga agcagaaccg      480
gacagagccc attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg      540
tgcgtacaaa gcacacacgt agacattcgt actttggaag accgtttaat gggcacacta      600
ggaattgtgt gccccatctg ttctcagaaa ccaactagtg gccaccatca ccatcaccat      660
taa                                                                                   663
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<210> 8

<211> 220

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and mutated E7 from Human papilloma
virus type 16)

<400> 8

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Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
      20              25              30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
      35              40              45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
      50              55              60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
      65              70              75              80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
      85              90              95
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Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu
 115 120 125
 Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gln Gln Leu Asn Asp Ser
 130 135 140
 Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro
 145 150 155 160
 Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser
 165 170 175
 Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu
 180 185 190
 Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser
 195 200 205
 Gln Lys Pro Thr Ser Gly His His His His His His
 210 215 220

<210> 9

<211> 879

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus
 pneumoniae and E6 from Human papilloma virus type
 16)

<400> 9

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cacacagacg gcaactggta ctggttcgac aactcagggc aaatggctac aggctggaag	180
aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc	240
aagtacaagg acacttggta ctacttagac gctaaagaag gcgccatggt atcaaagtgc	300
tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca	360
gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga	420
cccagaaagt taccacagtt atgcacagag ctgcaaacia ctatacatga tataatatta	480
gaatgtgtgt actgcaagca acagttactg cgacgtgagg tatatgactt tgcttttcgg	540
gatttatgca tagtatatag agatgggaat ccatatgctg tatgtgataa atgtttaaag	600
ttttattcta aaattagtga gtatagacat tattgttata gtttgtatgg aacaacatta	660
gaacagcaat acaacaaacc gttgtgtgat ttgttaatta ggtgtattaa ctgtcaaaag	720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata	780
aggggtcggt ggaccggtcg atgtatgtct tgttgcagat catcaagaac acgtagagaa	840
accagctga ctagtgcca ccatcaccat caccattaa	879

<210> 10
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 <212> PRT
 <213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6 from Human papilloma virus type 16)

<400> 10

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			20					25					30		
Met	Leu	Ala	Asp	Arg	Trp	Arg	Lys	His	Thr	Asp	Gly	Asn	Trp	Tyr	Trp
		35					40					45			
Phe	Asp	Asn	Ser	Gly	Glu	Met	Ala	Thr	Gly	Trp	Lys	Lys	Ile	Ala	Asp
	50					55					60				
Lys	Trp	Tyr	Tyr	Phe	Asn	Glu	Glu	Gly	Ala	Met	Lys	Thr	Gly	Trp	Val
65					70				75					80	
Lys	Tyr	Lys	Asp	Thr	Trp	Tyr	Tyr	Leu	Asp	Ala	Lys	Glu	Gly	Ala	Met
				85					90					95	
Val	Ser	Asn	Ala	Phe	Ile	Gln	Ser	Ala	Asp	Gly	Thr	Gly	Trp	Tyr	Tyr
		100						105					110		
Leu	Lys	Pro	Asp	Gly	Thr	Leu	Ala	Asp	Arg	Pro	Glu	Leu	Ala	Ser	Met
	115					120					125				
Leu	Asp	Met	Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu
	130					135					140				
Pro	Gln	Leu	Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu
145					150					155				160	
Glu	Cys	Val	Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp
				165					170					175	
Phe	Ala	Phe	Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr
	180							185					190		
Ala	Val	Cys	Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr
	195					200						205			
Arg	His	Tyr	Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr
	210					215					220				
Asn	Lys	Pro	Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys
225					230					235				240	
Pro	Leu	Cys	Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg

245 250 255
 Phe His Asn Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys
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 275 280 285
 His His His His
 290

<210> 11
 <211> 720
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus
 pneumoniae and E7 from Human papilloma virus type
 16)

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 cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag 180
 aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc 240
 aagtacaagg acacttggta ctacttagac gctaaagaag gcgccatggt atcaaattgcc 300
 tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca 360
 gacaggccag aattggccag catgctggac atggccatgc atggagatac acctacattg 420
 catgaatata tgtagattt gcaaccagag acaactgatc tctactgtta tgagcaatta 480
 aatgacagct cagaggagga ggatgaaata gatgggtccag ctggacaagc agaaccggac 540
 agagccatt acaatattgt aaccttttgt tgcaagtgtg actctacgct tcggttgtgc 600
 gtacaaagca cacacgtaga cattcgtact ttggaagacc tgtaaatggg cacactagga 660
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<210> 12
 <211> 239
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus
 pneumoniae and E7 from Human papilloma virus type
 16)

<400> 12

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		20						25					30		
Met	Leu	Ala	Asp	Arg	Trp	Arg	Lys	His	Thr	Asp	Gly	Asn	Trp	Tyr	Trp
		35					40						45		
Phe	Asp	Asn	Ser	Gly	Glu	Met	Ala	Thr	Gly	Trp	Lys	Lys	Ile	Ala	Asp
	50					55					60				
Lys	Trp	Tyr	Tyr	Phe	Asn	Glu	Glu	Gly	Ala	Met	Lys	Thr	Gly	Trp	Val
65					70					75					80
Lys	Tyr	Lys	Asp	Thr	Trp	Tyr	Tyr	Leu	Asp	Ala	Lys	Glu	Gly	Ala	Met
			85						90					95	
Val	Ser	Asn	Ala	Phe	Ile	Gln	Ser	Ala	Asp	Gly	Thr	Gly	Trp	Tyr	Tyr
		100						105					110		
Leu	Lys	Pro	Asp	Gly	Thr	Leu	Ala	Asp	Arg	Pro	Glu	Leu	Ala	Ser	Met
	115						120					125			
Leu	Asp	Met	Ala	Met	His	Gly	Asp	Thr	Pro	Thr	Leu	His	Glu	Tyr	Met
	130					135					140				
Leu	Asp	Leu	Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Cys	Tyr	Glu	Gln	Leu
145					150					155					160
Asn	Asp	Ser	Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly	Pro	Ala	Gly	Gln
			165						170					175	
Ala	Glu	Pro	Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr	Phe	Cys	Cys	Lys
		180						185					190		
Cys	Asp	Ser	Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr	His	Val	Asp	Ile
	195						200					205			
Arg	Thr	Leu	Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly	Ile	Val	Cys	Pro
	210					215					220				
Ile	Cys	Ser	Gln	Lys	Pro	Thr	Ser	Gly	His	His	His	His	His	His	
225					230						235				

<210> 13

<211> 1173

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

<400> 13

atgaaagggg gaattgtaca ttcagacggc tcttatccaa aagacaagtt tgagaaaatc

60

aatggcactt ggtactactt tgacagttca ggctatatgc ttgcagaccg ctggaggaag	120
cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag	180
aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc	240
aagtacaagg acaacttggtg ctacttagac gctaaagaag gcgccatggt atcaaatgcc	300
tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca	360
gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga	420
cccagaaagt taccacagtt atgcacagag ctgcaaacaa ctatacatga tataatatta	480
gaatgtgtgt actgcaagca acagttactg cgacgtgagg tatatgactt tgcttttcgg	540
gatttatgca tagtatatag agatgggaat ccatatgctg tatgtgataa atgttttaag	600
ttttattcta aaattagtga gtatagacat tattgttata gtttgtatgg aacaacatta	660
gaacagcaat acaacaaacc gttgtgtgat ttgttaatta ggtgtattaa ctgtcaaaag	720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata	780
aggggtcggg ggaccggctg atgtatgtct tggttcagat catcaagaac acgtagagaa	840
accagctga tgcattggaga tacacctaca ttgcatgaat atatgttaga tttgcaacca	900
gagacaactg atctctactg ttatgagcaa ttaaattgaca gctcagagga ggaggatgaa	960
atagatggtc cagctggaca agcagaaccg gacagagccc attacaatat tgtaaccttt	1020
tggttgcaagt gtgactctac gcttcgggtg tgcgtacaaa gcacacacgt agacattcgt	1080
actttggaag acctgttaat gggcacacta ggaattgtgt gcccatctg ttctcagaaa	1140
ccaactagtg gccaccatca ccataccat taa	1173

<210> 14

<211> 390

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

<400> 14

Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys	
1 5 10 15	
Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr	
20 25 30	
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp	
35 40 45	
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp	
50 55 60	
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val	
65 70 75 80	
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met	
85 90 95	

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
18)

<400> 15

```
atggatccaa gcagccattc atcaaatatg gccaataccc aaatgaaatc agacaaaatc      60
attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca      120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc      240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca      360
ttgcaagaca ttgtattgca tttagagccc caaaatgaaa ttccggttga ccttctatgt      420
cacgagcaat taagcgactc agaggaagaa aacgatgaaa tagatgaagt taatcatcaa      480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag      540
tgtgaagcca gaattgagct agtagtagaa agtcacgagc acgaccttcg agcattccag      600
cagctgtttc tgaacaccct gtcctttgtg tgtccgtggt gtgcatccca gcagactagt      660
ggccaccatc accatcacca ttaa                                     684
```

<210> 16

<211> 227

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
18)

<400> 16

```
Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1              5              10              15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
      20              25              30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
      35              40              45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
      50              55              60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
      65              70              75              80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
      85              90              95
```

Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu
 115 120 125
 Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu
 130 135 140
 Ser Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Glu Val Asn His Gln
 145 150 155 160
 His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys
 165 170 175
 Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser
 180 185 190
 Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser
 195 200 205
 Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His
 210 215 220
 His His His
 225

<210> 17
 <211> 109
 <212> PRT
 <213> Escherichia coli

<400> 17
 Met Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp
 1 5 10 15
 Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp
 20 25 30
 Cys Gly Pro Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp
 35 40 45
 Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn
 50 55 60
 Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu
 65 70 75 80
 Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser
 85 90 95
 Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala
 100 105

<210> 18
 <211> 684
 <212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and mutated E7 from Human papilloma virus type 18)

<400> 18

```
atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc      60
attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca      120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgttttagtg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc      240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca      360
ttgcaagaca ttgtattgca ttagagccc caaaatgaaa ttccggttga ccttctaggt      420
caccagcaat taagcgactc agaggaagaa aacgatgaaa tagatggagt taatcatcaa      480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag      540
tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag      600
cagctgtttc tgaacaccct gtcctttgtg tgtccgtggt gtgcatccca gcagactagt      660
ggccaaccatc accatcacca ttaa                                         684
```

<210> 19

<211> 227

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and mutated E7 from Human papilloma virus type 18)

<400> 19

```
Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1              5              10              15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20              25              30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35              40              45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50              55              60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65              70              75              80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
```


85										90					95				
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met				
100										105					110				
Ala	Met	His	Gly	Pro	Lys	Ala	Thr	Leu	Gln	Asp	Ile	Val	Leu	His	Leu				
115										120					125				
Glu	Pro	Gln	Asn	Glu	Ile	Pro	Val	Asp	Leu	Leu	Gly	His	Gln	Gln	Leu				
130										135					140				
Ser	Asp	Ser	Glu	Glu	Glu	Asn	Asp	Glu	Ile	Asp	Gly	Val	Asn	His	Gln				
145										150					155				
His	Leu	Pro	Ala	Arg	Arg	Ala	Glu	Pro	Gln	Arg	His	Thr	Met	Leu	Cys				
165										170					175				
Met	Cys	Cys	Lys	Cys	Glu	Ala	Arg	Ile	Glu	Leu	Val	Val	Glu	Ser	Ser				
180										185					190				
Ala	Asp	Asp	Leu	Arg	Ala	Phe	Gln	Gln	Leu	Phe	Leu	Asn	Thr	Leu	Ser				
195										200					205				
Phe	Val	Cys	Pro	Trp	Cys	Ala	Ser	Gln	Gln	Thr	Ser	Gly	His	His	His				
210										215					220				
His	His	His																	
225																			

<210> 20

<211> 837

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza virus B and E6 from Human papilloma virus type 18)

<400> 20

atggatccaa	gcagccattc	atcaaatatg	gcgaataccc	aatgaaatc	agacaaaatc	60
attattgctc	accgtggtgc	tagcggttat	ttaccagagc	atacgttaga	atctaaagca	120
cttgcgtttg	cacaacaggc	tgattattta	gagcaagatt	tagcaatgac	taaggatggt	180
cgttttagtg	ttattcacga	tcacttttta	gatggcttga	ctgatgttgc	gaaaaaattc	240
ccacatcgtc	atcgtaaaga	tggccgttac	tatgtcatcg	actttacctt	aaaagaaatt	300
caaagtttag	aaatgacaga	aaactttgaa	accatggcgc	gctttgagga	tccaacacgg	360
cgaccctaca	agctacctga	tctgtgcacg	gaactgaaca	cttcactgca	agacatagaa	420
ataacctgtg	tatattgcaa	gacagtattg	gaacttacag	aggtatttga	atttgcattt	480
aaagatttat	ttgtggtgta	tagagacagt	ataccgcatg	ctgcatgcca	taaatgtata	540
gatttttatt	ctagaattag	agaattaaga	cattattcag	actctgtgta	tggagacaca	600
ttggaaaaac	taactaacac	tgggttatac	aatttattaa	taaggtgcct	gcggtgccag	660
aaaccgttga	atccagcaga	aaaacttaga	caccttaatg	aaaaacgacg	atttcacaac	720

atagctgggc actatagagg ccagtgccat tcgtgctgca accgagcacg acaggaacga 780
ctccaacgac gcagagaaac acaagtaact agtggccacc atcaccatca ccattaa 837

<210> 21
<211> 278
<212> PRT
<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
18)

<400> 21

Met	Asp	Pro	Ser	Ser	His	Ser	Ser	Asn	Met	Ala	Asn	Thr	Gln	Met	Lys
1				5					10					15	
Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro
			20					25					30		
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
		35					40					45			
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
	50					55				60					
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe
65					70					75					80
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr
			85						90					95	
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
			100					105					110		
Ala	Arg	Phe	Glu	Asp	Pro	Thr	Arg	Arg	Pro	Tyr	Lys	Leu	Pro	Asp	Leu
		115					120					125			
Cys	Thr	Glu	Leu	Asn	Thr	Ser	Leu	Gln	Asp	Ile	Glu	Ile	Thr	Cys	Val
	130					135					140				
Tyr	Cys	Lys	Thr	Val	Leu	Glu	Leu	Thr	Glu	Val	Phe	Glu	Phe	Ala	Phe
145					150					155					160
Lys	Asp	Leu	Phe	Val	Val	Tyr	Arg	Asp	Ser	Ile	Pro	His	Ala	Ala	Cys
			165					170					175		
His	Lys	Cys	Ile	Asp	Phe	Tyr	Ser	Arg	Ile	Arg	Glu	Leu	Arg	His	Tyr
		180						185					190		
Ser	Asp	Ser	Val	Tyr	Gly	Asp	Thr	Leu	Glu	Lys	Leu	Thr	Asn	Thr	Gly
	195						200					205			
Leu	Tyr	Asn	Leu	Leu	Ile	Arg	Cys	Leu	Arg	Cys	Gln	Lys	Pro	Leu	Asn
	210					215					220				
Pro	Ala	Glu	Lys	Leu	Arg	His	Leu	Asn	Glu	Lys	Arg	Arg	Phe	His	Asn

225		230		235		240									
Ile	Ala	Gly	His	Tyr	Arg	Gly	Gln	Cys	His	Ser	Cys	Cys	Asn	Arg	Ala
		245		250		255									
Arg	Gln	Glu	Arg	Leu	Gln	Arg	Arg	Arg	Glu	Thr	Gln	Val	Thr	Ser	Gly
		260		265		270									
His	His	His	His	His	His										
	275														

<210> 22
 <211> 1152
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus influenza B and E6E7 fusion from Human papilloma virus type 18)

<400> 22

atggatccaa	gcagccattc	atcaaatatg	gcgaataccc	aaatgaaatc	agacaaaatc	60
attattgctc	accgtggtgc	tagcggttat	ttaccagagc	atacgttaga	atctaaagca	120
cttgcgtttg	cacaacaggc	tgattattta	gagcaagatt	tagcaatgac	taaggatggt	180
cgttttagtg	ttattcacga	tcacttttta	gatggcttga	ctgatgttgc	gaaaaaattc	240
ccacatcgtc	atcgtaaaga	tggcggttac	tatgtcatcg	actttacctt	aaaagaaatt	300
caaagtttag	aaatgacaga	aaactttgaa	accatggcgc	gctttgagga	tccaacacgg	360
cgaccctaca	agctacctga	tctgtgcacg	gaactgaaca	cttcaactga	agacatagaa	420
ataacctgtg	tatattgcaa	gacagtattg	gaacttacag	aggtatttga	atttgcatth	480
aaagatttat	ttgtggtgta	tagagacagt	ataccgcatg	ctgcatgcca	taaatgtata	540
gatttttatt	ctagaattag	agaattaaga	cattattcag	actctgtgta	tggagacaca	600
ttggaaaaac	taactaacac	tgggttatac	aatttattaa	taagggtgct	gcggtgccag	660
aaaccgttga	atccagcaga	aaaacttaga	caccttaatg	aaaaacgacg	atttcacaac	720
atagctgggc	actatagagg	ccagtgccat	tcgtgctgca	accgagcagc	acaggaacga	780
ctccaacgac	gcagagaaac	acaagtaatg	catggaccta	aggcaacatt	gcaagacatt	840
gtattgcatt	tagagcccca	aaatgaaatt	ccggttgacc	ttctatgtca	cgagcaatta	900
agcgactcag	aggaagaaaa	cgatgaaata	gatggagtta	atcatcaaca	tttaccagcc	960
cgacgagccg	aaccacaacg	tcacacaatg	ttgtgtatgt	gttgtaagtg	tgaagccaga	1020
attgagctag	tagtagaaag	ctcagcagac	gaccttcgag	cattccagca	gctgtttctg	1080
aacaccctgt	cctttgtgtg	tcggtggtgt	gcatcccagc	agactagtgg	ccaccatcac	1140
catcaccatt	aa					1152

<210> 23
 <211> 383
 <212> PRT

55

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and E6E7 fusion from Human papilloma virus type 18)

<400> 23

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1 5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
85 90 95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
100 105 110
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu
115 120 125
Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys Val
130 135 140
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe
145 150 155 160
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys
165 170 175
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr
180 185 190
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly
195 200 205
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn
210 215 220
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn
225 230 235 240
Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala
245 250 255
Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val Met His Gly
260 265 270
Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu Pro Gln Asn

275	280	285
Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu Ser Asp Ser Glu		
290	295	300
Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His Leu Pro Ala		
305	310	315
Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met Cys Cys Lys		
325	330	335
Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser Ala Asp Asp Leu		
340	345	350
Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe Val Cys Pro		
355	360	365
Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His His His His		
370	375	380

<210> 24
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 24
 tccatgacgt tcctgacgtt

20

<210> 25
 <211> 18
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 25
 tctcccagcg tgcgccat

18

<210> 26
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

57

<400> 26
accgatgacg tcgccggtga cggcaccacg

30

<210> 27
<211> 6
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 27
rrcggyy

6

<210> 28
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> E.coli

<400> 28
Thr Ser Gly His His His His His His
1 5